

REMARKS

Status of the Claims

Claims 1 – 20 are pending, with claims 1 and 18 being independent. The specification has been amended to insert the serial number, which was missing because it was unavailable at the time the application was filed. The missing serial number has been inserted as requested by the Examiner on page 1.

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the foregoing amendments and the following remarks.

Claim Rejections under 35 U.S.C. § 103(a)

Claims 1, 2, 4, 5 and 8-17 have been rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 3,972,958 to Garwood et al in view of U.S. Patent No. 2,452,121 to Grahame for reasons set forth on pages 3-5 of the Office Action. Reconsideration of this rejection is requested for at least the following reasons.

The present invention relates to a process for manufacturing a high octane alkylate from a Fischer-Tropsch synthesis. The process includes the steps of obtaining a C₃-C₄ light olefin fraction from a Fischer-Tropsch reactor, treating the light olefin fraction with a dehydration/isomerization catalyst to convert alkanols in the fraction to olefins and to isomerize the C₄ olefin portion of the fraction, optionally treating the light olefin fraction to reduce the oxygenate level to below about 4,000 ppm, mixing the treated light olefin fraction with an isoparaffin stream containing isobutane, reacting the mixture comprising the treated light olefin stream and the isoparaffin stream in the presence of an alkylation catalyst, and recovering a highly branched isoparaffinic alkylate having a research octane number of at least 80. Unexpectedly, the inventors discovered that light olefin streams from a Fischer-Tropsch synthesis can be processed to yield high octane alkylates using a catalyst which simultaneously dehydrates alcohols to reduce oxygenate levels and increase olefin levels while also isomerizing 1-butenes to 2-butenes even though conventional wisdom in the art considered light olefin streams from Fischer-Tropsch synthesis to be poorly suited as feedstocks for conversion to alkylates for the reasons discussed in the specification.

Garwood et al '958 discloses a process for converting coal into "high octane" aromatic gasoline. There is no description therein of what constitutes "high octane". There is no disclosure that the process produces an alkylated product having an octane number of at least 80. Also, the alkylate products obtained by the presently claimed process do not contain significant amounts of aromatics as discussed in the specification on page 25, lines 6-10. The processes of Garwood et al '958 yield an alkylation feed which is composed of C₃-C₄ olefins and isobutane. Unlike the present claims, there is no disclosure in Garwood et al '958 of separately mixing a light olefin stream having oxygenate levels below about 4000 ppm with an isoparaffin stream containing isobutane.

The Office Action states that the octane number of the alkylate recovered in the process of the reference "would necessarily be within the claims because the reactants are the same as claimed" (page 3, second paragraph). Respectfully, Applicants disagree with this statement.

To attain an alkylate having an octane number of at least 80 in accordance with the present invention, the light olefin fraction is subjected to catalytic dehydration/isomerization which significantly alters the composition of the fraction, i.e. converts alkanols to olefins which reduces oxygenate levels, increases olefin levels and increases 2-butene levels. These features are not disclosed in Garwood et al '958. Nor does Garwood et al '958 disclose or suggest several other features set forth in the dependent claims as acknowledged on page 3, third paragraph, of the Office Action. Thus, Applicants respectfully submit that the reactants are not the same as that claimed and there would be no expectation that the octane number of the recovered alkylate would be within the scope of the present claims. For at least the aforementioned reasons, Garwood et al '958 does not fairly suggest the process set forth in claims 1, 4, 6-10 and 16. Nor does the disclosure of Grahame '121 supply the many deficiencies of Garwood et al '958.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success.

Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The motivation to modify the prior art references must flow from some teaching in the art that suggests the desirability or incentive to make the modifications needed to arrive at the claimed invention. In re Napier, 55 F.2d 610, 613; 34 U.S.P.Q. 2d 1782, 1784 (Fed. Cir. 1995). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the claimed combination. In re Geiger, 815 F.2d 686, 688; 2 U.S.P.Q.2d 1276, 1278 (Fed. Cir. 1987). As stated in In re Kotzab, 217 F.3d 1365, 1370, 55 U.S.P.Q.2d 1313, 1316-17 (Fed. Cir. 2000),

[m]ost if not all inventions arise from a combination of old elements. Thus, every element of a claimed invention may often be found in the prior art. However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant [citations omitted].

There is no disclosure or suggestion in Garwood et al '958 that the presence of oxygenates is undesirable. As a matter of fact, the presence of methanol is required in the two-step conversion procedure discussed in this document. Accordingly, there is nothing in Garwood et al '958 that would provide motivation to those of ordinary skill to remove oxygenates from the product streams thereof. Moreover, even if one combined the disclosures of Garwood et al '958 and Grahame '121, there is no reasonable expectation that removal of oxygenates by the technique of Grahame '121 would be successful and not adversely affect the objective of Garwood et al '958, i.e., recovering a high octane aromatic gasoline.

Grahame '121 contains no disclosure or suggestion that the treated hydrocarbon fraction can be used in an alkylation reaction. Therefore, one of ordinary skill would not be motivated to modify the process of Garwood et al '958 to include the dehydration/isomerization technique of Grahame '121. As indicated above, Garwood et al

'958 does not contemplate oxygenate reduction and does not blend separate feeds of light olefins and isoparaffins to effect alkylation. Since there is nothing in the cited art that suggests the desirability or incentive to make the modification necessary to arrive at the presently claimed invention, Applicants submit that there is no *prima facie* case of obviousness.

In view of the above distinctions, the §103(a) rejection based on Garwood et al '958 in combination with Grahame '121 should be withdrawn. Such action is earnestly requested.

Claim 3 was rejected under 35 U.S.C. §103(a) as unpatentable over Garwood et al '958 in view of Grahame '121 and further in view of U.S. Patent No. 4,234,412 to Boersma et al for reasons set forth on pages 5-6 of the Office Action. The rejection is respectfully traversed for at least the following reasons.

The combined disclosures of Garwood et al '958 and Grahame '121 fail to disclose or suggest the presently claimed invention for at least the reasons enunciated previously. The disclosure of Boersma et al '412 does not supply these deficiencies.

Specifically, the objectives of Boersma et al '412, as opposed to those of the present invention, concern the production of aromatic gasoline which is environmentally undesirable as mentioned previously or relate to the production of low pour point fuel oil. The process of Garwood et al '958 produces a fraction containing light olefins and isoparaffins which is then alkylated. No motivation exists for modifying the process of Garwood et al '958 in accordance with the teachings of Boersma et al '412. There are several different embodiments described in Boersma et al '412 (see column 5, line 34 to column 7, line 36). Absent the present disclosure, there is nothing in this reference that would lead those of ordinary skill to select any particular embodiment, let alone the one discussed in the paragraph beginning in column 4, line 64.

For at least the above reasons, the §103(a) rejections based on combining Garwood et al '958 with Grahame '121 and Boersma et al '412 should be withdrawn. Such action is respectfully requested.

Claims 6 and 7 stand rejected under 35 U.S.C. §103(a) as unpatentable over Garwood et al '958 in view of Grahame '121 and further in view of U.S. Patent No. 4,041,097 to

Ireland et al for the reasons expressed on page 6 of the Office Action. Reconsideration of the rejection is requested for at least the reasons which follow.

According to the Office Action, Ireland et al '097 discloses a procedure whereby oxygenates contained in Fischer-Tropsch fractions are removed by water washing. However, there is no disclosure that the level of oxygenates remaining in the fraction is within the ranges of the present claims. Nor is there any incentive in Garwood et al. '958 to suggest removal of oxygenates. Thus, the combined disclosures of Garwood et al. '958, Grahame '121 and Ireland '097 fail to suggest the process set forth in claims 6 and 7.

For at least the above reasons, the §103(a) rejection of claims 6 and 7 should be withdrawn. Such action is earnestly solicited.

Claims 18-20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Garwood et al in view of Grahame '121, Boersma et al '412 and Ireland et al '097 for reasons expressed on pages 7-9 of the Office Action. Reconsideration of this rejection is respectfully requested for at least the following reasons.

As discussed above, Garwood et al '958 fails to disclose or suggest several features of the claimed invention. While each of the above cited documents may individually disclose isolated features of the presently claimed invention, this is insufficient to establish a *prima facie* case of obviousness of the invention as described in claims 18-20. There is no disclosure or suggestion in any of the individual documents which teaches the desirability of combining all these features to arrive at the claimed invention. It is the Applicants who have devised a scheme whereby individual fractions obtained in a Fischer-Tropsch synthesis can be integrated into a total system to obtain a high octane alkylate.

Even if one combines the disclosures of all four cited documents, all of the features in claims 18-20 would not be met. The cited art does not disclose octane numbers of at least 80, nor oxygenate levels below 4000 or 1000 ppm, nor providing a fraction containing at least 30 wt. % isobutane, nor alkylating separate feeds of isomerized/dehydrated light olefin fraction and isoparaffinic fraction.

In view of the above, the §103(a) rejections based on Garwood et al '958, Grahame '121 and Boersma et al '412 and Ireland '097 should be reconsidered and withdrawn. Such action is earnestly solicited.

Double Patenting

Claims 1-20 have been provisionally rejected on the ground of obviousness-type double patenting over claims 1-16 of copending application No. 10/059,388 for reasons given on page 9 of the Office Action. Reconsideration and withdrawal of this rejection is requested for the following reasons.

Applicants disagree with this rejection and believe the respective claims are directed to patentably distinct inventions. Accordingly, Applicants believe that the present claims are patentable over the claims of the '388 application. However, to facilitate allowable subject matter, Applicants will consider submitting a terminal disclaimer over the '388 application under separate cover, as appropriate, once allowable subject matter has been agreed upon. The filing of a Terminal Disclaimer is not to be construed as an admission of the propriety of the rejection on obvious double patenting. *Quad Environmental Technologies Corp. v. Union Sanitary District*, 946 F.2d 870, 20 USPQ2d 1392 (Fed. Cir. 1991).

In view thereof, Applicants respectfully request that this rejection be withdrawn.

Conclusion

For the reasons noted above, the art of record does not disclose or suggest the inventive concept of the present invention as defined by the claims. In view of the foregoing remarks, reconsideration of the claims and allowance of the subject application is earnestly

solicited. The Examiner is invited to contact the undersigned at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted,

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